

TRANSCRIPT

Leaded Aviation Gasoline and Child Blood Lead Levels, with Marie Lynn Miranda

[THEME MUSIC]

AHEARN: It's *The Researcher's Perspective*. I'm Ashley Ahearn.

We haven't driven cars with leaded gasoline for decades, and the switch from leaded to unleaded gasoline drastically decreased atmospheric lead emissions.¹

But lead exposure remains a problem, especially for children. Nearly half a million U.S. kids have blood lead levels above the point at which the Centers for Disease Control and Prevention recommends intervention.²

So where's that lead coming from?

One source is aircraft, which made up almost 60% of lead emissions in the U.S. air in 2008.³

We turn now to Marie Lynn Miranda. She is the dean of the School of Natural Resources and Environment and holds an appointment in the Department of Pediatrics at the University of Michigan. She's an expert on childhood lead exposure.

Dean Miranda, thanks for joining me.

MIRANDA: Hi, Ashley. Thank you so much for inviting me to join you.

AHEARN: First question for me here is, why is there still lead in airplane fuel? We got it out of gasoline with great results. Why is it still needed for planes?

MIRANDA: So first of all, it's important to remember that we're not talking about all fuel for airplanes. The commercial jets that you fly around in from Chicago to Washington, DC, for example, would not be using lead-containing gasoline; they're kerosene-based fuels. So it's actually aviation fuel for smaller planes, which are used recreationally for small plane piloting operations, etc. Of those planes, about 75% of them can use very-low-level lead fuel, but the other 25% require that sort of higher octane that is made possible with the tetraethyl lead additive.

The problem is, so you say, oh, well, that's only 25% of the planes, but those 25% of the planes actually consume a disproportionate amount of the lead-containing aviation fuel because they're flying a lot more.

AHEARN: Why do these smaller planes continue to use lead in their fuel?

MIRANDA: Well, part of it is a distribution problem, that for the planes that *can* use the lower-lead gasoline they actually have to be able to fuel up with the lower-lead gasoline, and the issues with getting a second pump at these places where planes fuel up is difficult. The other part of it is that, you know, we don't have policies in place that require people to use the lower-lead fuel, and so, given that, there's not the same incentive for people to purchase different types of fuels and for distributors and suppliers to make those other types of fuels available.

AHEARN: And before we continue, why is it a problem that lead is still in certain types of aviation fuel? Tell me about the human health impacts.

MIRANDA: Lead is a known neurotoxicant and is especially problematic for young children. We've known that lead is a neurotoxicant for a very long time. People have been working on lead exposure for a very long time, and the more research we do, the more we understand there does not seem to be a safe limit or a threshold for exposure to lead. So exposure to lead is just a bad idea. If we can find ways to decrease children's exposures to lead, moving forward on those types of policies is important for protecting our children.

AHEARN: Is there a difference between exposure to lead from say, old paint in a rundown part of Cincinnati, or exposure to lead from airplanes that we were just talking about, that, that may be taking off or landing nearby?

MIRANDA: Absolutely. So if you ask me to name the top three sources of childhood lead exposure that I worry about, the first one would be deteriorating lead-based paint in older housing. The second one would be lead exposure through the water system because of changes in the water-treatment systems that may, on occasion, lead to liberation of lead from the piping systems. And the third one is lead exposure through toys, foods, and other substances manufactured in countries that don't have the same safety regulations in the manufacturing process.

So those are my top three. Lead exposure from aviation gasoline near airports doesn't make it into my top three, but as I said before, lead is a known neurotoxicant, and while the increases in childhood blood lead levels that are associated with living near an airport where leaded aviation gasoline is used are relatively small, they're important in the sense that you're increasing the body burden of a neurotoxicant in a child.

AHEARN: You were the lead author on a paper published in *EHP* titled "A Geospatial Analysis of the Effects of Aviation Gasoline on Childhood Blood Lead Levels."⁴ Where did you conduct your research? And tell me a little bit about what you found.

MIRANDA: Well we used data from the state of North Carolina. We received data from the EPA on which airports in the state of North Carolina were using leaded aviation fuel, or "avgas." Then we also had access to the childhood blood lead screening data in the state of North Carolina. So we selected from the airports that the EPA told us were using

aviation gasoline. We selected those airports where we had good-quality childhood blood lead screening data.

So there were five counties in North Carolina, and we took all the airports that used avgas and then looked at children who had been screened for lead who lived within 500 meters or 1,000 meters or 1,500 meters or 2,000 meters of that boundary of the airports. And we controlled for the age of the housing that the child lived in, we controlled for their income and race status, both of which are predictive of blood lead levels. And we tried to determine whether or not proximity to the airports was associated with increased blood lead levels, and in fact we found that it was.

AHEARN: By how much?

MIRANDA: Well, it's a small increase. What we see on average across the population, what we see is about a 4.4% higher blood lead level amongst kids who are living within 1,000 meters of the airport compared to other children.

AHEARN: So who lives near airports? Is this an environmental justice issue, Dean Miranda?

MIRANDA: I don't have all the detailed data on the demographics of who lives near airports at this moment. We are in the process of working on that question but in general it is true that it is lower-income communities that live in proximity to airports.

AHEARN: So what's to be done? What does that data tell you? What does your research tell you about this issue?

MIRANDA: First of all, we need to pay attention to the policy issue or the regulatory issue regarding whether or not we should actually let aviation gasoline that contains lead continue to be used. This is going to require us to be creative in working with the owners of these small aircraft and the producers of the various fuel types and the distributors of the fuel to make sure that we get a workable policy solution in place sooner rather than later.

Secondly, we need to reach out to families who live in proximity to the airports to make sure they know that this risk exists and help them to figure out what are the things they can do to minimize the risks associated with lead exposure from avgas.

AHEARN: What are some of those things? What can you do if you live near an airport and you want to protect your children from lead exposure?

MIRANDA: Well, since we published that article we've actually had a number of calls from families who have this very concern, and so what we always say to them is first of all, let's look at the top three sources of lead exposure and make sure that your child isn't at risk for them. So we talk to them about the age of their housing, the state of repair of that housing, whether or not the water has ever been tested, what kinds of products are

they purchasing, etc. The second thing that we do is we talk to them about the importance of good lead-safe cleaning practices and soil cover⁵ to make sure that any deposition of lead from aviation gasoline is less biologically available to the children who might be playing out in the yard. Third, we emphasize the point that if your child has good nutrition even if exposed to lead they're less likely to uptake that lead.

AHEARN: So it seems like the science is pretty settled. Do we need more research on lead exposure to inform and speed up policy on lead in aviation fuel, and if so, what kind of questions remain for you?

MIRANDA: I'm convinced that there's not a safe level of lead exposure. I think a lot of other scientists who are working on lead believe that's true as well, but cleaning up lead is expensive, and in order for us to, in a realistic and meaningful way, enter the policy process we need to understand both what are the costs of cleaning up lead but also what are the costs of not cleaning up the lead. So increasingly we need to be looking at what are these very low levels of lead exposure. Are they meaningful in terms of the lives that children lead and the things that they are able to accomplish as they grow into adulthood?

AHEARN: Dean Miranda, thanks so much for joining me.

MIRANDA: Thank you, Ashley.

AHEARN: Marie Lynn Miranda is the dean of the School of Natural Resources and Environment and holds an appointment in the Department of Pediatrics at the University of Michigan.

And that's *The Researcher's Perspective*. I'm Ashley Ahearn. Thanks for downloading!

[THEME MUSIC FADES UP]

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¹ EPA. Air Quality Criteria for Lead. Volume I of II. EPA/600/R-5/144aF. Research Triangle Park, NC: National Center for Environmental Assessment, RTP Division, Office of Research and Development, U.S. Environmental Protection Agency (Oct 2006). Available: <http://www.epa.gov/ncea/isa/index.htm> [accessed 4 Dec 2012].

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⁴ Miranda ML, et al. A geospatial analysis of the effects of aviation gasoline on childhood blood lead levels. Environ Health Perspect 119(10):1513–1516; <http://dx.doi.org/10.1289/ehp.1003231>.

⁵ EPA. Lead: Protect Your Family [website]. Washington, DC:Office of Pollution Prevention & Toxics, U.S. Environmental Protection Agency (updated 26 Oct 2012). Available: <http://www.epa.gov/lead/parents.html> [accessed 4 Dec 2012].